

LNG Shipping News

AN LNG JOURNAL TITLE ON LNG CARRIERS

21 June 2018

Australia and US head LNG trade growth

Global LNG trade reached 38.2 bill cu ft per day last year, a 10% (3.5 bill cu ft per day) increase from 2016 and the largest annual volume increase ever recorded.

According to the International Association of Liquefied Natural Gas Importers' annual report. Australia and the US were not surprisingly among the countries with the gas export largest increases (2.7 bill cu ft per day combined) in 2017.

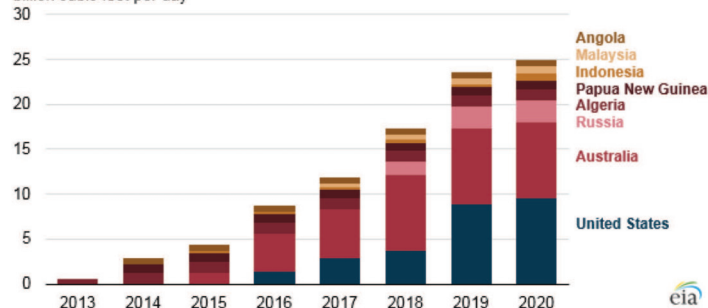
In 2017, there were 19 LNG exporting and 40 LNG importing countries. The return to service of Angola LNG and increases from several countries, including Nigeria, Malaysia, Algeria, Russia and Brunei added another 1.4 bill cu ft per day of LNG exports, more than offsetting a combined decline of 0.6 bill cu ft per day in exports from Qatar, Indonesia, Norway, Peru, the UAE and Trinidad.

Asian countries led the growth in global LNG imports, accounting for 74% (2.6 bill cu ft per day) of last year's increase. Japan remained the largest LNG importer at 11 bill cu ft per day in 2017.

Chinese influence

China saw the largest growth in LNG imports globally at 1.5 bill cu ft per day and became the world's second largest LNG importer in 2017, overtaking South Korea. LNG imports also increased in South Korea, Pakistan, Taiwan and Thailand.

Natural gas liquefaction capacity additions, 2013-2020
billion cubic feet per day



Europe increased its LNG imports by 1.4 bill cu ft per day, primarily driven by Spain, Italy, Portugal, France and Turkey. UK LNG imports declined by 0.34 bill cu ft per day (35%), one of only two countries in Europe to register declines in LNG imports, as lower winter heating demand from the residential sector and increased electricity generation from wind, reduced the demand for natural gas.

LNG imports in South America remained by and large unchanged from 2016. In North America, Mexico's LNG imports increased by 17%, as the country continued to rely on LNG supplies amid declining domestic production and construction delays in infrastructure connecting the domestic grid to natural

gas pipeline exports from the US.

LNG imports into the Middle East declined by 9%, primarily to Egypt and the UAE (Dubai).

LNG trade growth was driven partly by new liquefaction capacity commissioned in Australia, the US and Russia. The world's first floating liquefaction plant, Malaysia's 'PFLNG Satu' was also commissioned last year.

Since 2013, the US and Australia have added a combined 9.67 bill cu ft per day of new liquefaction capacity, with another 8.3 bill expected to be completed by 2020. Including the US and Australian additions, projects currently under construction are forecast to increase global liquefaction capacity by 13.5 bill cu ft per day by 2022, the report said.

'Prelude' receives cool down cargo

Shell's giant FLNG 'Prelude' received a cool-down cargo from the LNGC 'Gallina' last week.

'Gallina' transferred the gas to 'Prelude', as the FLNG prepares for commissioning. This was the first time that Prelude has had an LNGC berthed

alongside and the plant's loading arms were tested.

'Prelude' is testing her systems in preparation for first gas from Shell's Prelude field, which holds an estimated 3 trillion cu ft of natural gas (in combination with the adjacent

Concerto field).

Royal Dutch Shell said that it hoped to begin generating revenue from the project this year.

The FLNG has a nameplate capacity of 3.6 million tonnes per annum.

SHIPPING NEWS AGENDA

MARKETING

- Second Cameroon FLNG? **2**
- Petronas' first STS transfer **2**

BUSINESS



- First FSRU for Nakilat **3**
- Mozambique LNG deal signed **3**
- AGL signs infrastructure project **4**
- Large Philippines project **4**

TECHNOLOGY

- Simulating Tangguh project **6**
- Extended coatings contract **7**
- ClassNK looks at tanks **7**



- TMC wins TMS LNGC orders **7**
- FLNG fitted with B + V equipment **7**

LNG ORDERBOOK

- LNG carrier orderbook **9**
- LNG small scale fleet **11**

PETRONAS undertakes first LNG STS

PETRONAS LNG Ltd (PLL) has completed its first LNG ship-to-ship (STS) transfer in Brunei Bay.

An LNG cargo from Malaysia LNG Sdn Bhd (MLNG), Bintulu was transferred from the mother LNGC, 'Seri Bijaksana' to the daughter LNGC 'Lucia Ambition'.

Following the STS, the LNG cargo on the 'Lucia Ambition' and remaining cargo on 'Seri Bijaksana' will be delivered to their respective buyers.

PETRONAS Vice President of LNG Marketing & Trading, Ahmad Adly Alias, said: "As the LNG mar-

ket becomes more liquid and with the emergence of new markets and non-traditional buyers who face operational constraints at their terminals, PETRONAS is committed to supporting the growth of these markets through providing innovative and flexible operational solutions, such as LNG breakbulk services via STS."

He added that today's Asian buyers prefer to grow their LNG business gradually by importing

smaller parcels of LNG, moving away from the traditional mode of long term supplies over a specific term.

The completion of the STS was a collaborative effort involving various stakeholders, including Ports and Harbour Department Sabah, Sabah Port Authority, Argo Engineering Sdn Bhd, Eastport Marine Sdn Bhd, MISC Bhd and Farenco Shipping Pte Ltd.

'Lucia Ambition' is a 1993-built 18,800 cu m LNGC reactivated from cold layup in Labuan in February, 2017 having been sold to Farenco Shipping. She is managed by Farenco subsidiary Fleet Management and is under contract to ship LNG from the Petronas terminal at Bintulu to China.

“...PETRONAS is committed to supporting the growth of these markets through providing innovative and flexible operational solutions...”

- Ahmad Adly Alias, PETRONAS

A second FLNG for Cameroon?

CMLNG, a wholly owned subsidiary of New Age LNG Limited, has signed a gas convention agreement (GCA) with the Government of Cameroon, to develop a second FLNG project in the country.

Under the agreement, the company will use a newly-built FLNG to process gas from the Etinde production sharing licence.

As a result of a competitive tendering process undertaken during 2016, a contract was awarded to a consortium led by SBM Offshore, in conjunction with JGC Corp and Chinese partners, to develop the FLNG.

In addition to the production vessel, it is anticipated that a substantial onshore administration and logistical support base will be developed in Limbe or Douala, including offices, warehousing, workshops and other

support services.

The FLNG project will be developed in conjunction with the upstream Etinde development, which will include gas and gas liquid production facilities supplying LNG and other gas customers.

To develop the required skills sought by the project, CMLNG said it will be running comprehensive training and graduate placement programmes. A dedicated training centre is also planned for Douala.

Steve Lowden, New Age LNG Limited Chairman, said: "I am delighted that New Age LNG and the Cameroon Government have

agreed fiscal terms to launch Cameroon's largest gas project. The outlook for LNG markets is structurally attractive through the first half of the next decade when our project will be coming on stream.

"As well as providing a major source of local employment, the project is expected to generate significant tax revenue annually, becoming a material contributor to the local economy. I look forward to working closely with the Cameroon Government and our other partners to successfully develop this important project," he said.

Fleet joiners and leavers

Alpha Gas has firmed up an option for a third LNGC from Daewoo Shipbuilding & Marine Engineering (DSME).

The contract, which was signed on 7th June at this year's Posidonia event in Greece, calls for the 173,400 cu m vessel to be delivered in the first half of 2021.

The option was agreed on the back of two LNGCs ordered at DSME by Alpha Gas in late March, 2018 for \$370 mill in total.

The original pair will be built at Okpo shipyard in Geoje and will be delivered by the end of 2020, according to DSME. They will be fitted with MEGI engines.

Brokers have also reported that Turkish company Botas had ordered a 170,000 cu m FSRU at Hyundai for 2020 delivery.

Daewoo Shipbuilding & Marine Engineering, said Tuesday that it had delivered an LNGC with a full re-liquefaction system (FRS) without giving details.

The company claimed it now had the technology to build LNGCs with either the partial re-liquefaction system (PRS) or the FRS system.

Most of the LNGC ship orders DSME received thus far this year include the FRS system, the shipbuilder said.

The company also has the technology to apply the FRS system to an LNGC powered either by a high-speed ME-GI engine or by a low-speed X-DF dual-fuel engine.

Reported to be leaving the fleet are the 1975-built LNGCs 'Belanak' and the 1972-built 'Bebatik', which were sold to Chinese interests for 'green' recycling, brokers said.

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Nakilat gains its first FSRU

Nakilat is to establish a joint-venture company with Excelerate Energy to acquire a 55% interest in an FSRU.

The FSRU is the 'Exquisite', which has a capacity of 150,900 cu m and a peak regasification rate of 745 mill cu ft per day. She is currently moored at Port Qasim in Pakistan, and has received 10.4 mill tonnes of LNG since she started operations in 2015, out of which 7.8 mill tonnes was Qatari LNG.

She will be the first FSRU to join Nakilat's LNGC fleet.

Qatar Minister of Energy and Industry and Nakilat Chairman, HE Dr Mohammed Bin Saleh Al Sada, said, "This acquisition is pivotal to the State of Qatar, as this is the first FSRU co-owned by a Qatari company, which paves the way for Qatari LNG to expand its outreach to developing and emerging markets. This will enable Nakilat to widen its international outreach and thus, secure its industry-leading position in the dynamic and competitive LNG market."

Nakilat CEO, Eng Abdullah Al

Sulaiti, said: "We are extremely proud to be the first Qatari company to acquire ownership in an FSRU in an effort to maintain our leadership in energy transportation and simultaneously support the country's position as the top exporter of clean energy worldwide."

"Excelerate Energy is a well-recognised global leader in floating LNG regasification solutions, and this agreement marks the beginning of our penetration into the FSRU market. This opens up a new business avenue for Nakilat to sustain its long-term growth and development strategies, which in turn will further maximise value and returns for our shareholders. We shall continue to develop in-house capabilities to establish and develop knowhow in the management of FSRUs to achieve the company's vision in becoming a global leader and provider of choice for energy transportation

and maritime services," he said.

Excelerate Energy's Managing Director, Steven Kobos, said: "We are incredibly pleased to be entering into this important foundational relationship with Nakilat. Excelerate's FSRUs ensure rapid-to-market and reliable LNG solutions that complement our integrated services along the entire LNG value chain."

"In 2017, the FSRU 'Exquisite'

delivered more regasified LNG ashore than any FSRU in history. This offering of the FSRU unit to the joint-venture company along with Nakilat's expertise and reputation as the world's largest LNG shipowner will serve the State of Qatar well as they seek access to emerging global LNG markets. We look forward to a successful working relationship with Nakilat and Qatar," he concluded. ■

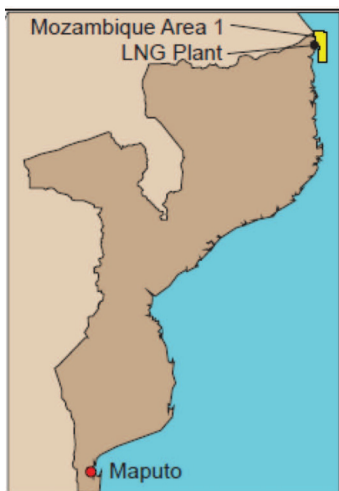


Nakilat has signed an agreement to acquire its first FSRU

Mozambique LNG Project purchase deal signed

Tokyo Gas and Centrica LNG, a subsidiary of UK-based energy and services company Centrica plc, have jointly signed a non-binding Heads of Agreement (HoA) with the jointly-owned sales entity of the Mozambique Area 1 joint venture partners for long-term LNG offtake.

Tokyo Gas and Centrica have agreed to purchase 2.6 mill tonnes per annum, delivered ex-ship from the Mozambique LNG project from the start-up of production until the early 2040s.



The supply agreement provides the project with key foundation customers, which will facilitate the final investment decision (FID) by the Mozambique Area 1 joint venture partners, the companies said.

Tokyo Gas and Centrica originally signed a Memorandum of Understanding (MoU) in November, 2016 to collaborate with their LNG activities.

Central location

This joint procurement scheme is aimed at taking full advantage of Mozambique's central location between Europe and Asia to assist both companies in pro-actively managing demand fluctuations across regions, they said.

This transaction represents the first long-term offtake agreement from Africa for both companies, which is in line with ongoing efforts to further diversify their respective LNG portfolio sources.

Commenting on the HoA, Iain Conn, Centrica's Group CEO, said: "As like-minded leading natural gas suppliers in our respective home countries, we are delighted to strengthen our strategic partnership with Tokyo Gas and expand our flexible LNG portfolio through this agreement with Mozambique LNG."

"Centrica has established strong LNG capabilities over the past few years and this agreement signed today demonstrates further progress in this growth area of our

business," he said.

Takashi Uchida, Representative Director, President of Tokyo Gas, added: "For Tokyo Gas, we are hoping that our commitment will contribute to the start-up of the Mozambique LNG Project."

"We are very happy that through this first ever joint procurement with Centrica that utilises the unique central location of Mozambique, we have created the foundation for flexible LNG transactions to occur between the European and Asian markets. I hope that through this innovative agreement, we can further diversify source and price index, which leads to enhancing our challenges of securing more competitive LNG," he explained. ■

AGL signs two gas import jetty agreements

AGL has signed two agreements to advance the proposed gas import jetty project at Crib Point, Victoria, Australia.

The first enables berth upgrades at the Port of Hastings, as well as the leasing agreement that would be required, should the project go ahead.

The second, with APA Group, is for the Crib Point to Pakenham pipeline to transport imported gas to homes and businesses.

The project still remains subject to approvals, community consultation and AGL's final investment decision (FID).

AGL's spokesman, Kelly Parkinson, explained: "Although we have been consulting with community members and governments since 2017, some community members are still understandably concerned about the project and the impact

it might have.

"We will continue to engage and involve any stakeholders in the assessment process. We're carrying out feasibility into using the Crib Point Jetty because this has been identified as the best site to minimise local impact," he said.

Port of Hastings CEO, Malcolm Geier, said he is working with AGL as the project assessments and feasibility studies continue.

"The Port team looks forward to working with AGL and the community on the next phase of what is an exciting project for the Port and Crib Point," he confirmed.

The port authority will begin initial work to prepare for AGL's proposed use of the berth for the

mooring of an FSRU. These works include upgrades to pylons and measures to protect the jetty from damage.

Parkinson said he is aware of concerns over the environmental impact of the project.

"We are very aware that Western Port is an environmentally sensitive area and many areas within it are covered by the RAMSAR international convention on the protection of wetlands," he said. "There is already an existing jetty that currently functions for petrol importation. It has an existing deepwater berth that does not require deep dredging and importantly it's a relatively short distance from the Victorian gas network." ■

GLNG ships 200th cargo

The GLNG project, in which Santos has a 30% stake, has shipped its 200th LNG cargo from Curtis Island near Gladstone to South Korea.

The LNGC, 'YK Sovereign', berthed at the Incheon terminal last week to discharge the cargo.

Santos CEO, Kevin Gallagher, said the natural gas industry is building a better future for hundreds of millions of people throughout the Asian region.

"For the next two decades, the International Energy Agency expects natural gas to grow more than any other energy type, to a market share of more than a quarter of all global energy demand," he said. "Population growth, rapid urbanisation and the need to clean up air pollution across Asia will drive demand for Australian LNG. And as a lower carbon alternative to coal, natural gas will continue to play a key role in the pathway to lower carbon emissions.

"If all of Australia's LNG exports from next year were used to replace legacy coal-fired power generation in Asia, the emissions saving would be 300 mill tonnes a year.

"The GLNG project is investing around A\$900 mill in upstream production infrastructure this year alone, providing ongoing jobs and business opportunities across Queensland.

"Santos is drilling a record 300 wells in Queensland this year. More gas production increases total east coast supply, which is good for both the domestic gas market and LNG exports," he concluded. ■

Philippines signs LOI for large LNG infrastructure project

South Korea's SK E&S signed a Letter of Intent (LOI) with the Department of Energy of the Philippines last week aimed at constructing LNG infrastructure worth \$1.7 bill.

The South Korean company presented a blueprint to the Philippines government for the construction of a LNG terminal with the capacity of up to 5 mill tonnes per year, several LNG power plants of more than 600 MW, and an up to 150 km long pipeline connecting the terminal and power plants in Luzon Island, north of the Philippines.

SK E&S said that it had advocated the development of a large scale LNG infrastructure based on its expectation of the Philippines

government's needs in response to a growing demand for LNG.

The Philippines has entirely relied on the Malampaya offshore gas field as its only supply source for natural gas. However, these gas reserves are expected to be depleted by 2024 and the growing demand for electricity to fuel economic growth underscores the strong needs for LNG imports.

In the meantime, SK E&S opened a local office in Manila in September last year to seek ways to contribute to the LNG infrastruc-

ture development in the country.

A spokesperson for SK E&S said "If the LNG infrastructure development project SK E&S proposed is realised, the project is expected to create 800,000 jobs per year, or 2,200 jobs per day during the construction."

The LOI signed between SK E&S and the Philippines' Department of Energy is one of three major projects included in the MOU for mutual energy co-operation between South Korea and the Philippines signed earlier. ■

NEWS NUDGE

'GasLog Sydney' taken on period charter

GasLog Partners has signed a new multi-year timecharter for the 'GasLog Sydney' with a wholly owned subsidiary of Cheniere Energy.

The charterer has options to extend the agreement, which is scheduled to commence this year, for up to two

consecutive periods at escalating rates.

The 155,000 cu m tri-fuel diesel electric 'GasLog Sydney' is currently on a multi-year timecharter with a wholly owned subsidiary of Royal Dutch Shell plc redelivering in September, 2018.

Built in 2013, the vessel is currently undergoing a sched-

uled drydocking during which a reliquefaction module will be fitted.

"The execution of the charter further diversifies our customer base and increases our contracted revenue visibility, supporting our year-on-year distribution growth guidance of 5% to 7% in 2018," CEO Andy Orekar, said. ■

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Navigation simulation used in Tangguh LNG expansion programme

Work has started the Indonesian Tangguh LNG plant expansion project, which involves the addition of a third train to increase the liquefaction capacity by 3.8 mill tonnes per year.

This will also result in the expansion of the marine export facility and construction of a second LNG jetty.

McConnell Dowell Indonesia, who is conducting the detailed design and construction of the jetty, has commissioned HR Wallingford to conduct ship navigation simulation studies, to prove the suitability of the jetty design.

As part of the design process for the jetty, HR Wallingford undertook a combined fast time and real time ship navigation simulation study.

These two elements were used to examine all of the navigation aspects of the Tangguh LNG expansion project, including navigation to and from the second jetty, towage requirements, limiting environmental operational conditions, anchorage areas and safety exclusion zones.

The first element of the work, the fast time simulation, used HR Wallingford's Ship Simulation System running in fast time mode, which is used to assist in the design of relatively straight channels. The study focused on the channel and approaches to the new jetty, and examined a number of classes of LNGCs and condensate tankers.

The second element, the real time navigation simulation, which

used a full mission bridge simulator, focused on the final approaches and the turning manoeuvres, where real time simulation is a more reliable tool.

Hydrodynamic model

In preparation, HR Wallingford's flow modellers constructed a 2D hydrodynamic model of the area. This was then validated against in-situ flow measurements, which had been carried out prior to the study.

The real time navigation simulation session was conducted at HR Wallingford's Australia Ship Simulation Centre in Fremantle, Western Australia. A local Tangguh pilot and HR Wallingford's staff pilot, manoeuvred the ships in the final approaches to the virtual second jetty, using up to 4 x 55 tonne bollard pull tugs.

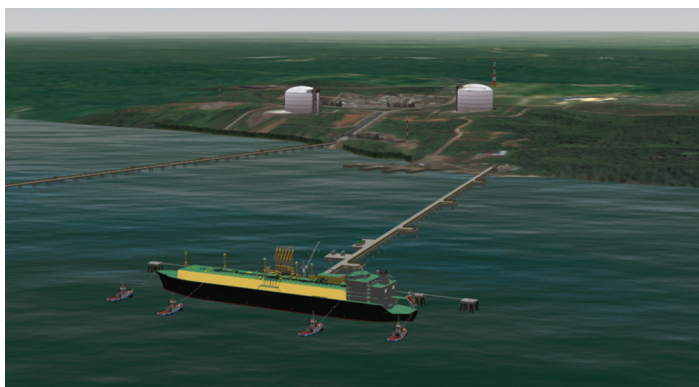
McConnell Dowell's design manager, Fabien Cogordan, said: "Being able to take advantage of HR Wallingford's fast time simulation meant that we could conduct over 8,000 channel transits, equivalent to over 25 years of vessel calls to Tangguh, in a matter of minutes of computer processing time. Combin-

ing this with the real time navigation simulation, provided us with a cost-effective and flexible tool to evaluate and confirm the suitability of the jetty design."

Dr Mark McBride, HR Wallingford Ships Group Manager, said: "The HR Wallingford Ship Navigation Simulation System has been specifically designed for port design and ship operations' applications, and our full bridge, real time manoeuvring simulators can be used for pilot and tug master training as well. We're delighted to have been able to apply our knowledge to a project like this in Indonesia, which will have a significant impact on the industry and the local economy."

The marine construction EPC contract was awarded to CSTS, a consortium consisting of Chiyoda, Saipem, Tripatra and Suluh Ardhi Engineering. Construction of the third train is now underway, which will bring the total plant capacity to 11.4 mill tonnes of LNG per annum, with first production from the third train expected during 2020.

The plant has been operated by BP Berau Ltd since 2009. ■



A simulation of Tangguh's proposed second jetty

Adriatic LNG handles 600th LNGC

Italian offshore regasification terminal Adriatic LNG has received its 600th LNGC, the 'Al Jassasiya'.

She arrived from Ras Laffan in Qatar and delivered around 140,000 cu m of natural gas.

Adriatic LNG's Commercial Manager, Corrado Papa, commented: "Once again our regasification terminal confirmed its strategic role for the national and European energy supply system. Crossing the line of 600 carriers safely moored and discharged is certainly a milestone, which proves the high efficiency and reliability of this infrastructure of excellence, whose success is also based on the use of

environmentally friendly technologies and the promotion of a strong safety culture."

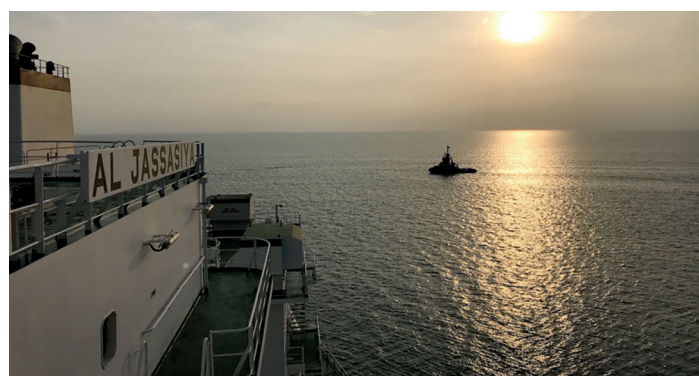
In the first five months of this year, the terminal received 30 LNGCs.

Operating since October, 2009, the Adriatic LNG terminal opened up a new phase in Italian energy supply system, by importing LNG from Qatar, Egypt, Trinidad and Tobago, Equatorial Guinea, Norway, Nigeria and the US.

With a regasification capacity of 8 bill cu m per year (equal to half

the national LNG import capacity), the terminal is claimed to be a

strategic infrastructure for the diversification of energy supply. ■



'Al Jassasiya' seen approaching Adriatic infrastructure

TMC to equip LNG carriers

TMC Compressors of the Seas (TMC) is to supply complete marine compressed air systems and associated equipment to three TMS Cardiff Gas Ltd LNGCs being built by Hyundai Heavy Industries (HHI).

TMC will provide two control air compressors, one service air compressor, two SCR (selective catalytic reduction) compressors, two N₂ (nitrogen) feed air compressors and two refrigerant air dryers for each of the vessels.

TMS Cardiff Gas signed a contract with HHI to build three 174,000 cu m LNGCs fitted with XDF propulsion. They are due for delivery in 2020.

The first vessel is to enter into a seven year timecharter contract with TOTAL Gas & Power Chartering Limited, while the other two are earmarked for undisclosed oil majors.

"This is a significant equipment order to three big vessels," said Hans Petter Tanum, TMC's director of sales and business devel-



TMS has won a contract to fit equipment on board TMS Cardiff's newbuilding LNGCs

opment. "It is highly encouraging to see that our marine compressed air systems seem to be the favoured solution for the majority of newbuild LNG vessels.

"Operators are increasingly focusing on high quality compressors to keep operational expenditure to a minimum during the lifetime of the vessel. This seems to benefit us," he added. ■

AkzoNobel extends coatings contract with Nakilat

AkzoNobel has secured a two-year deal to continue to supply Intersleek 1100SR foul release coating to Nakilat.

The two companies already having a long-standing relationship and the new agreement means that by the end of 2018, more than 640,000 litres of Intersleek 1100SR will have been applied to 108 of Nakilat's LNGCs worldwide.

"We are very proud to have signed this new deal, which strengthens our well-established relationship with such a valuable customer," said Oscar Wezenbeek, Director of AkzoNobel's Marine, Protective and Yacht Coatings

business. "It highlights our commitment to better serving our customers and underlines the fact that that shipowners and operators continue to realise the benefits of investing in sustainable hull coatings including reduction of cost and higher efficiency."

In total, there have been more than 1,400 applications of Intersleek 1100SR to date. The 1,000th application landmark was achieved in 2017 when Nakilat's LNGC 'Al Gattara' was coated. ■

FLNG fitted with B+V technology

As highlighted in LNG Shipping News of 7th June, full commercial operations have officially begun on board Golar LNG's FLNG 'Hilli Episeyo.'

The first two LNG cargoes produced by the FLNG have already left Cameroon.

'Hilli Episeyo' is fitted with Black & Veatch's patented PRICO technology.

The primary contract for the FLNG vessel conversion was signed with Singapore's Keppel Shipyard Limited in July, 2014. Keppel simultaneously entered into a sub-contract with Black & Veatch, which provided its licensed PRICO technology, performed detailed engineering and process design, specified and procured topside equipment, and provided commissioning support for the FLNG vessel topsides and liquefaction process.

Black & Veatch's PRICO technology uses a single-mixed refrigerant loop for natural gas liquefaction. That process provides several key benefits, including requiring minimal equipment and a compact pro-

cess footprint that makes it ideal for offshore liquefaction, the company claimed.

"The first dispatches of cargo prove that the concept of converting an LNG carrier to an LNG production platform is commercially viable," said Bob Germinder, Black & Veatch Senior Vice President and Managing Director of Floating Oil & Gas Solutions. "These transfers are powerful confirmation that our technology provides clients with a major advantage in LNG production and shipment."

Commercial viability was named by survey respondents as the top driver for making FLNG investment decisions, followed by implementation costs, according to Black & Veatch's most recent 'Strategic Directions: Natural Gas Industry Report'.

Cost and speed of delivery were top priorities for investors. ■

ClassNK addresses independent prismatic tanks

Class Society ClassNK has released 'Guidelines for Liquefied Gas Carrier Structures – Independent Prismatic Tanks'.

This specifies the technical requirements specifically related to the structural strength assessments of gas carriers by using direct calculations.

Published in two parts, the guidelines include 'Guidelines for Direct Strength Analysis', and 'Guidelines for Fatigue Strength Assessment', which are currently in development.

'Guidelines for Direct Strength Analysis' specifies yield strength and buckling strength by direct strength analysis using the net scantling of primary structural members, as well as previously released ClassNK guidelines for the structures of other ship types.

In addition, the Guidelines feature specific requirements for assessment methods taking into

account the complex interaction of loads between hull structures and cargo tanks independent from the hull structures. They target independent cargo tank structures and their support structures, as well as hull structures.

They specify not only the design loads dominant for each structure, strength analysis methods and corrosion deductions, but also the design scenarios in which assessments are required by the IMO IGC Code, therefore covering all structural requirements for gas carriers with independent prismatic tanks.

The guidelines are available to download free of charge via ClassNK's website www.classnk.com for those who have registered for the ClassNK 'My Page' service. ■

NEWS NUDGE

GTT receives another order from HHI

GTT has received an order from Hyundai Heavy Industries to design the tanks of a new 174,000 cu m LNGC.

She is being built for Thenamaris for delivery in delivery in September, 2020.

The tanks will be equipped with the Mark III Flex membrane

containment system.

Philippe Berterottière, GTT Chairman and CEO, said: "This new order reinforces our long-term partnership with Hyundai Heavy Industries, with whom we have managed more than 50 newbuilds. We are also very pleased to accompany, once more, Thenamaris on its vessels projects." ■

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Diamond Gas Orchid	Mitsubishi H.I.	Moss	165000	STaGE	01/06/2018	2015	NYK
Flex Ranger	Samsung	TZ Mk. III	174000	MEGI	01/06/2018	2013	Flex LNG
Pan Europe	Hudong-Zhonghua	GT NO 96	174000	TFDE	01/06/2018	2014	Teekay LNG
British Partner	DSME	GT NO 96	173400	MEGI	01/06/2018	2014	BP
Megara	DSME	GT NO 96	173400	MEGI	01/07/2018	2014	Teekay LNG
Flex Rainbow	Samsung	TZ Mk. III	174000	MEGI	25/07/2018	2013	Flex LNG
LNG Schneeweissen	DSME	GT NO 96	180000	TFDE	31/07/2018	2015	MOL
Rudolf Samoylovich	DSME	GT NO 96	172410	TFDE - Azipod	01/08/2018	2014	Teekay LNG
Energy Liberty	Japan Marine United Corp	SPB	165000	TFDE	01/08/2018	2014	MOL
Diamond Gas Rose	Mitsubishi H.I.	Moss	165000	STaGE	01/08/2018	2015	NYK
Enshu Maru	Kawasaki	Moss	164000	STRH	30/08/2018	2014	K-Line
Castillo De Caldelas	Imabari	TZ Mk. III	178000	MEGI	01/09/2018	2014	Elcano
Vladimir Vize	DSME	GT NO 96	172410	TFDE - Azipod	01/09/2018	2014	MOL
Kinisis	DSME	GT NO 96	173400	MEGI	15/09/2018	2015	Chandris
British Achiever	DSME	GT NO 96	173400	MEGI	01/10/2018	2014	BP
Georgiy Brusilov	DSME	GT NO 96	172410	TFDE - Azipod	01/10/2018	2014	Dynagas
Marvel Eagle	Kawasaki	Moss	155000	TFDE	19/10/2018	2014	MOL
Jmu Tsu 5071	Japan Marine United Corp	SPB	165000	TFDE	01/11/2018	2014	NYK
British Contributor	DSME	GT NO 96	173400	MEGI	01/11/2018	2014	BP
Boris Davydov	DSME	GT NO 96	172410	TFDE - Azipod	01/11/2018	2014	Dynagas
Marvel Hawk	Samsung	GTT Mark III Flex	174000	XDF	01/12/2018	2014	MOL
Marvel Crane	Mitsubishi H.I.	Moss	177000	STaGE	01/12/2018	2015	NYK
Nikolay Zubov	DSME	GT NO 96	172410	TFDE - Azipod	01/12/2018	2014	Dynagas
Samsung 2150	Samsung	GTT Mark III Flex	174000	XDF	01/01/2019	2014	MOL
Maran Gas Spetses	DSME	GT NO 96	173400	MEGI	01/01/2019	2015	Maran Gas Maritime
Daewoo 2444	DSME	GT NO 96	173400	MEGI	01/01/2019	2014	BP
Mitsubishi Nagasaki 2323	Mitsubishi H.I.	Moss	177000	STaGE	01/01/2019	2015	MOL
Maran Gas Chios	DSME	GT NO 96	173400	MEGI	01/01/2019	2015	Maran Gas Maritime
Maran Gas Hydra	DSME	GT NO 96	173400	MEGI	01/01/2019	2015	Maran Gas Maritime
Hyundai Samho S856	Hyundai Heavy	TZ Mk. III	174000	MEGI	01/01/2019	2015	Teekay LNG
Gaslog Gladstone	Samsung	TZ Mk. III	174000	XDF	01/01/2019	2014	GasLog
Yamal Spirit	Hyundai Heavy	TZ Mk. III	174000	MEGI	01/01/2019	2015	Teekay LNG
Pan Africa	Hudong-Zhonghua	GT NO 96	174000	TFDE	01/01/2019	2014	Teekay LNG
Shinshu Maru	Kawasaki	Moss	177000	STRH	01/02/2019	2015	MOL
British Mentor	DSME	GT NO 96	173400	MEGI	01/02/2019	2014	BP
Nohshu Maru	Mitsubishi H.I.	Moss	180000	STaGE	01/02/2019	2015	NYK
Jmu Tsu 5072	Japan Marine United Corp	SPB	165000	TFDE	01/03/2019	2014	MOL
British Sponsor	DSME	GT NO 96	173400	MEGI	01/03/2019	2014	BP
Hyundai Ulsan 2937	Hyundai Heavy	GTT Mark III Flex	180000	XDF	01/04/2019	2016	SK Shipping
Diamond Gas TBN	Mitsubishi H.I.	Moss	165000	STaGE	01/05/2019	2015	Mitsubishi
Hyundai Ulsan 2964	Hyundai Heavy	GTT Mark III Flex	180000	MEGI	01/05/2019	2017	Knutsen

DFDE = dual fuel diesel engines, STRH = steam turbine reheat / ultra steam turbine, MEGI = marine electric gas injection, DRL = slow speed diesel, FSRU = vessel with regas capacity, FLNG = floating LNG production unit
Data last updated = 6th June 2018

Name	Yard	Containment System	Capacity	Propulsion	Delivery Date	Ordered	Primary Owner
Bushu Maru	Mitsubishi H.I.	Moss	180000	STaGE	01/06/2019	2015	NYK
Flex Constellation	DSME	GT NO 96	173400	MEGI	01/06/2019	2017	Flex LNG
Hyundai Ulsan 2963	Hyundai Heavy	GTT Mark III Flex	180000	MEGI	01/06/2019	2017	Knutsen
Sohshu Maru	Kawasaki	Moss	177000	STRH	01/07/2019	2015	MOL
Hyundai Ulsan 2938	Hyundai Heavy	GTT Mark III Flex	180000	XDF	01/07/2019	2016	SK Shipping
Jmu Tsu 5073	Japan Marine United Corp	SPB	165000	TFDE	01/07/2019	2014	MOL
Daewoo 2430	DSME	GT NO 96	172000	TFDE - Azipod	01/07/2019	2014	Teekay LNG
Maran Gas Syros	DSME	GT NO 96	173400	MEGI	01/07/2019	2014	Maran Gas Maritime
Gaslog Windsor	Samsung	GTT Mark III Flex	180000	XDF	01/07/2019	2017	GasLog
Kawasaki Sakaide 1729	Kawasaki	Moss	155000	TFDE	01/08/2019	2014	MOL
Daewoo 2431	DSME	GT NO 96	172000	TFDE - Azipod	01/08/2019	2014	Teekay LNG
Flex Courageous	DSME	GT NO 96	173400	MEGI	01/08/2019	2017	Flex LNG
Daewoo 2432	DSME	GT NO 96	172410	TFDE - Azipod	01/09/2019	2014	MOL
Mitsubishi Nagasaki 2322	Mitsubishi H.I.	Moss	177000	STaGE	01/09/2019	2015	MOL
Daewoo 2466	DSME	GT NO 96	173400	MEGI	01/10/2019	2016	Maran Gas Maritime
Daewoo 2433	DSME	GT NO 96	172000	TFDE - Azipod	01/10/2019	2014	Teekay LNG
Daewoo 2467	DSME	GT NO 96	173400	MEGI	01/11/2019	2016	Maran Gas Maritime
Daewoo 2489	DSME	GT NO 96	173400	MEGI	01/11/2019	2015	BWGas
Daewoo 2434	DSME	GT NO 96	172000	TFDE - Azipod	01/11/2019	2014	Teekay LNG
MOL HUDONG-ZHONGHUA 1/4	Hudong-Zhonghua	GT NO 96	174000	MEGI	01/12/2019	2017	MOL
DSME 2490	DSME	GT NO 96	173400	MEGI	01/02/2020	2018	BWGas
MOL HUDONG-ZHONGHUA 2/4	Hudong-Zhonghua	GT NO 96	174000	MEGI	01/03/2020	2017	MOL
HHI NYK/EDF	Hyundai Heavy	GTT Mark III Flex	174000	XDF	30/04/2020	2018	NYK
DSME 2491	DSME	GT NO 96	173400	MEGI	01/05/2020	2018	BWGas
Daewoo 2478	DSME	GT NO 96	173400	MEGI	31/05/2020	2017	Maran Gas Maritime
Samsung 2213	Samsung	GTT Mark III Flex	180000	XDF	01/06/2020	2016	GasLog
HHI / Total	Hyundai Heavy	GTT Mark III Flex	174000	XDF	01/06/2020	2018	Cardiff Marine
HHI / Total / Sovc	Hyundai Heavy	GTT Mark III Flex	174000	XDF	01/06/2020	2018	Sovcomflot
HHI / Cardiff #1	Hyundai Heavy	GTT Mark III Flex	174000	XDF	01/06/2020	2018	Cardiff Marine
HHI / Cardiff #2	Hyundai Heavy	GTT Mark III Flex	174000	XDF	01/06/2020	2018	Cardiff Marine
Flex Aurora	Hyundai Heavy	GTT Mark III Flex	174000	XDF	01/06/2020	2018	Flex LNG
SHI Gaslog #1	Samsung	GTT Mark III Flex	180000	XDF	01/06/2020	2018	GasLog
Hyundai Ulsan 3086	Hyundai Heavy	GTT Mark III Flex	180000	MEGI	01/06/2020	2018	Knutsen
Daewoo 2469	DSME	GT NO 96	173400	MEGI	30/06/2020	2016	Maran Gas Maritime
MOL HUDONG-ZHONGHUA 3/4	Hudong-Zhonghua	GT NO 96	174000	MEGI	01/07/2020	2017	MOL
DSME 2479	DSME	GT NO 96	173400	MEGI	01/08/2020	2018	John Fredriksen
Flex America	Hyundai Heavy	GTT Mark III Flex	174000	XDF	01/08/2020	2018	Flex LNG
DSME 2480	DSME	GT NO 96	173400	MEGI	01/09/2020	2018	John Fredriksen
SHI Gaslog #2	Samsung	GTT Mark III Flex	180000	XDF	01/09/2020	2018	GasLog
MOL HUDONG-ZHONGHUA 4/4	Hudong-Zhonghua	GT NO 96	174000	MEGI	01/10/2020	2017	MOL
DSME 2483	DSME	GT NO 96	173400	MEGI	01/10/2020	2018	Alpha Gas
DSME 2484	DSME	GT NO 96	173400	MEGI	01/12/2020	2018	Alpha Gas
DSME Minerva #1	DSME	GT NO 96	173400	MEGI	01/03/2021	2018	Minerva Marine
DSME Minerva #2	DSME	GT NO 96	173400	MEGI	01/07/2021	2018	Minerva Marine

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WORLD SMALL SCALE LNG FLEET*

Built	Name	CBM	Cargo Type	Trading area	Trading in LNG?	Ship Owner / Operator
1974	Seagas	187	LNG	Sweden	Yes	AGA
1988	Kayoh Maru	1,517	LNG	Japan	Yes	Daiichi
1993	Aman Bintulu / Lucia Ambition	18,928	LNG	Malaysia - Japan	Yes	Perbadanan/NYK
1996	Surya Aki	19,475	LNG	Indonesia - Japan	Yes	MCGC
1997	Aman Sendai	18,928	LNG	Malaysia - Japan	Yes	Perbadanan/NYK
1998	Aman Hakata	18,800	LNG	Malaysia - Japan	Yes	Perbadanan/NYK
2000	Tripura (ex Surya Satsuma)	23,096	LNG	Indonesia - Japan	Yes	MCGC
2003	Pioneer Knutsen	1,100	LNG	Norway	Yes	Knutsen
2003	Shinju Maru No.1	2,540	LNG	Japan	Yes	Shinwa
2005	North Pioneer	2,500	LNG	Japan	Yes	Japan Liquid Gas
2007	Sun Arrows	19,531	LNG	Malaysia - Russia - Japan	Yes	Mitsui
2008	Kakurei Maru	2,536	LNG	Japan	Yes	Hogaki Zosen
2008	Shinju Maru No.2	2,540	LNG	Japan	Yes	Shinwa
2009	Coral Methane	7,551	LNG/LPG/Ethylene	Northwest Europe/Baltics	Yes, sometimes	Anthony Veder
2010	Norgas Creation	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2010	Norgas Innovation	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Akebono Maru	3,556	LNG	Japan	Yes	Chuo Kaiun
2011	Norgas Conception	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Norgas Invention	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Vision Spirit	12,000	LNG/LPG/Ethylene	Worldwide	No	Teekay
2011	Unikum Spirit	12,000	LNG/LPG/Ethylene	Worldwide	No	Teekay
2012	Coral Energy	15,600	LNG	Northwest Europe/Baltics	Yes	Anthony Veder
2013	JX Energy TBN	2,500	LNG	Japan	Yes	JX Energy
2013	Kakuyu Maru	2,500	LNG	Japan	Yes	Tsurumi Sunmarine
2013	Coral Anthelia	6,500	LNG/Ethylene			Anthony Veder
2014	LNG-Oil combi**	2,000	LNG	Germany	Yes	Veka
2014	Short Sea LNG Tanker **	4,000	LNG	Germany	Yes	Veka
2015	LNG Inland bunker**	800	LNG	Germany	Yes	Veka
2015	LNG bunker barge 1†	2,250	LNG	China	Yes	Anhui Huaqiang Natural Gas
2015	LNG bunker barge 2†	2,250	LNG	China	Yes	Anhui Huaqiang Natural Gas
2015	LNG bunker barge 3†	2,250	LNG	China	Yes	Anhui Huaqiang Natural Gas
2015	LNG Barge TBN	3,000	LNG	US Coast	Yes	LNG America
2015	10 small carriers TBN**	5,000	LNG			Bimantara Group
2015	Jahre TBN**	6,200	LNG	Norway	Yes	Donsotank/Jahre Marine
2015	Norgas TBN**	17,000	LNG/LPG/Ethylene	Worldwide		Norgas Carriers
2015	Norgas TBN**	17,000	LNG/LPG/Ethylene	Worldwide		Norgas Carriers
2015	JS Ineos Ingenuity	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2015	JS Ineos Insight	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2015	JS Ineos Intrepid	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2015	TBN 1	27,500	LNG	China?		Danyang?
2015	TBN 2	27,500	LNG	China?		Danyang?
2015	TBN 3	27,500	LNG	China?		Danyang?
2015	PetroChina TBN	30,000	LNG	China		PetroChina
2016	Clean Jacksonville	2,200	LNG	US Coast	Yes	CME
2016	LNG Prime	2,250	LNG	Northwest Europe	Yes	Veka Deen LNG
2016	HUA XIANG 8	13,720	LNG	China	Yes	Zhejiang Huaxiang
2016	JS Ineos Indepence	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2016	JS Ineos Innovation	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2016	JS Ineos Inspiration	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2016	Hai Yang Shi You 301	30,000	LNG	Bali FSU	Yes	CETS (CNOOC)
2016	Navigator Aurora	35,000	Ethane/Ethylene	Markus Hood - Stenungsund	Ethane, for Borealis	Navigator
2016	Gaschem Beluga	36,000	Ethane/Ethylene	US - Teeside	Ethane, for Sabic	Gaschem Services
2016	Gaschem Orca	36,000	Ethane/Ethylene	US - Teeside	Ethane, for Sabic	Gaschem Services
2016	Ocean Yield TBN**	36,000	Ethane/Ethylene	US - Teeside	Ethane, for Sabic	Gaschem Services

For more information please visit <http://small-lng.com>

*Includes multi-gas, ethylene and LNG bunker ships with 40,000 cubic metres LNG cargo capacity or less

TBN = To Be Nominated indicates ships are still at construction/planning stage

** = project shelved † = Data to be verified Data last updated = 6th June 2018

Built	Name	CBM	Cargo Type	Trading area	Trading in LNG?	Ship Owner / Operator
2017	Oizmendi	600	LNG	Bilbao	Yes	Itsas Gas
2017	CME TBN†	2,200	LNG	US Coast	Yes	CME
2017	CME TBN†	2,200	LNG	US Coast	Yes	CME
2017	ENGIE Zeebrugge	5,000	LNG	Northwest Europe	Yes	NYK
2017	Coralius	5,800	LNG	Northwest Europe/Baltics	Yes, for Skangas	Anthony Veder
2017	Cardissa	6,500	LNG	Northwest Europe	Yes	Shell
2017	LNG-Gorskaya TBN	7,300	LNG	Russia	Yes	LNG-Gorskaya
2017	LNG-Gorskaya TBN	7,300	LNG	Russia	Yes	LNG-Gorskaya
2017	LNG-Gorskaya TBN	7,300	LNG	Russia	Yes	LNG-Gorskaya
2017	Coral EnergICE	18,000	LNG	Northwest Europe/Baltics	Yes	Anthony Veder
2017	JS Ineos Invention	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2017	JS Ineos Intuition	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2017	Yuan He 1	30,000	LNG	China	Yes	CSR
2017	Navigator Eclipse	35,000	Ethane/Ethylene	US	Ethane	Navigator
2017	Navigator Nova	35,000	Ethane/Ethylene	US	Ethane	Navigator
2017	Navigator Prominence	35,000	Ethane/Ethylene	US	Ethane	Navigator
2018	CME TBN†	2,200	LNG	US Coast	Yes	CME
2018	Shell Bunker Barge TBN 4	3,000	LNG	Northwest Europe	Yes	Shell
2018	Shell Bunker Barge TBN 2	6,500	LNG	Northwest Europe	Yes	Shell
2018	Shell Bunker Barge TBN 3	6,500	LNG	Northwest Europe	Yes	Shell
2018	Kairos	7,500	LNG	Baltic	Yes	Bernhard Schulte
2018	Qi Yuan	28,000	LNG	China	Yes	Dalian Inteh Group
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Bunker Breeze	0	LNG	Barcelona	Yes	Suardiaz Energy Shipping
2019	KLine TBN	7,500	LNG	Korea	Yes	Korea Line
2019	KLine TBN	7,500	LNG	Korea	Yes	Korea Line
2019	Stolt TBN	7,500	LNG	Mediterranean	Yes	Stolt-Nielsen Gas
2019	Stolt TBN	7,500	LNG	Mediterranean	Yes	Stolt-Nielsen Gas
2020	Shell Bunker Barge	4,000	LNG	US Coast	Yes	Q-LNG Transport / Harvey Gulf
2020	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas
2020	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas
2020	Total TBN	18,600	LNG	NWE	Yes	MOL
2020	FuelLNG TBN	7,500	LNG	Singapore	Yes	FuelLNG
2021	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas

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